SYSTRON DONNER

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SYSTRON DONNER

WARRANTY AND REPAIR

Issued 1 January 1974

SHIPMENT DAMAGE

The instrument described in this manual should be tested as soon as it is received. If it fails to operate properly or is damaged in any way, a claim must be filed with the carrier. Have carrier agent inspect damage to instrument and packing crate and forward us a copy of his written report. You will then be advised of replacement or repair arrangements and disposition of the equipment. Please *include model number and serial number* when referring to this instrument for any reason.

WARRANTY

Systron-Donner (Sunnyvale) products are warranted against defects in workmanship and materials. This warranty is limited to repair or replacement of products or parts which prove defective in normal service after delivery to original purchaser. The warranty period is two years for all instruments and parts manufactured at the Sunnyvale, California plant of Systron-Donner Corporation. The warranty period on cathode ray tubes and YIG-tuned oscillators, built by other manufacturers, is limited to one year. Although Systron-Donner endeavors to purchase the finest quality parts available, the warranty from the manufacturer on these major components is one year.

Beyond the "shipment damage" provisions, no warranty attaches to the detection element used in Model 4020 Digital Power Meter power heads. Failures of this element are usually caused by excessive input power or by physical shock (dropping the power head), neither of which can be covered by warranty.

If any fault develops:

1. Notify the local service center or the factory, giving *full details* of the difficulty, *including the model number and serial number.* Upon receipt of this information, you will be sent service or shipping instructions.
2. Upon receipt of shipping instructions, forward the instrument prepaid and insured, and repairs will be made at the service center or factory. If requested, an estimate will be made before the work begins when the instrument is not covered by this warranty.

Systron-Donner Corporation is not responsible for consequential damage or loss of data in the event of equipment failure.

PACKING

The instrument described in this manual should be packed in the original carton. If original carton is unusable or not available, use a heavy cardboard box with approximately three inches of foam or other shock-absorbing material surrounding the instrument. If desired, packing services of a local transfer and storage company may be employed. Specific packing instructions are given in Section 2 of most instruction manuals.

SHIPPING METHOD

The instrument described in this manual should only be shipped by truck freight, rail freight, air freight, or parcel delivery service. *If it is shipped by parcel post, damage is likely to occur.* Systron-Donner is not responsible for units damaged in shipment to the service center or factory for repair, whether such units are in warranty or not.

INSURANCE

For your own protection, insure the unit for full value whenever it is shipped.

SYSTRON-DONNER CORPORATION – SUNNYVALE INSTRUMENTS GROUP
735 PALOMAR AVENUE, SUNNYVALE, CALIFORNIA 94086 • Phone (408) 735-9660 • TWX 910-339-9309

INSPECTION CHARGES

Nominal inspection charges will be levied if a unit returned for warranty repairs shows no evidence of malfunction or if it operates within its published specifications.

FREIGHT CHARGES

Instruments returned for warranty repair must be sent with *all freight charges prepaid* to the factory in Sunnyvale, California or to the local Systron-Donner service center in your area. After repair, instruments will be returned from the factory or local service center with "collect" freight charges, or freight costs will be billed later.

If air freight or other premium shipment method is desired, please notify the factory or the local service center in advance so arrangements can be made.

SYSTRON DONNER SERVICE CENTERS

Eleven customer service centers are in operation throughout the United States, Europe, and The Pacific. It may be to your advantage to use these local centers for warranty repair, non-warranty repair, or calibration services. If no service center is listed for your area, call the local SCIENTIFIC DEVICES Office for information.

NEW ENGLAND

Systron Donner Service Center
580 Moody Street
Waltham, Massachusetts 02154
Telephone (617) 894-0559

EAST COAST

Systron Donner Service Center
71 Grand Avenue
Palisades Park, New Jersey 07650
Telephone (201) 945-4500

WASHINGTON, D.C. AREA

Systron Donner Service Center
6615 Backlick Road
Springfield, Virginia 22150
Telephone (703) 451-6500

MIDWEST

Systron Donner Service Center
2720 Des Plaines Avenue
Des Plaines, Illinois 60018
Telephone (312) 297-5240

SOUTHWEST

Systron Donner Service Center
312 North Central Expressway
Richardson, Texas 75080
Telephone (214) 231-8106

NORTHERN CALIFORNIA

Systron Donner Service Center
655 West Evelyn Avenue
Mountain View, California 94041
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SOUTHERN CALIFORNIA

Systron Donner Service Center
3662 Katella Avenue, Suite 105
Los Alamitos, California 90720
Telephone (213) 596-1684

UNITED KINGDOM

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Bodensee Strasse 113
D-8000 Munich 60
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AUSTRALIA

Systron-Donner Pty. Ltd.
2 Vautier Street
Elwood, Victoria 3184
Telephone 91 2223

SECTION 1

INTRODUCTION AND DESCRIPTION

1.1 SCOPE OF MANUAL

This interim manual is supplied to provide operating information, specifications, and schematic diagrams for 5000 series RF plug-ins. Permanent instruction manuals, when available, will include application information, operating instructions, theory of operation, and maintenance instructions.

A permanent manual will be sent to replace this interim manual upon written request; such request must include the model number and serial number of the plug-in and the complete address to which the manual should be sent.

1.2 DESCRIPTION

Model 5000 series RF plug-ins are used in the Kruse Model 5000 Sweeper, in the Model 5000A Sweep Oscillator, in the Model 50520 Multiband Sweep System, and (with a Model 579 Plug-in Adapter) the Model 540 Multiband Sweeper.

With the exception of beat-frequency oscillator plug-in such as the 5005 and dual-band plug-in such as the 5014-10, all standard RF plug-ins are single-band, fundamental frequency types. Twenty-four standard plug-ins are currently available, covering the frequency range of 100 kHz to 18 GHz. Ten plug-ins will cover the range of 100 kHz to 18 GHz with minimal overlap.

In addition to the standard units, over eighty special units have been produced to satisfy customer requirements for plug-ins with special features; these include ultra-wideband units, narrow band units, high power units, Mil-Spec units, etc. Details of special units are available upon request.

1.3 OPTIONS

Optional configurations of the 5000 series plug-in available on order include:

Option M2. Internal power leveling. Available on 5010 through 5013 plug-ins (500 MHz to 4 GHz). Allows the RF output of the plug-in to be leveled at the RF out connector without the use of external levelers (plug-ins below 500 MHz include internal leveled circuitry).

Option M6. Constant phase-lock sensitivity with 10 kHz bandwidth. Normally, the sensitivity at the phase lock input of the sweeper mainframe (which is connected directly to the plug-in) is a function of the RF output frequency. Option M6 changes this to a constant (customer-specified) factor of the plug-in bandwidth per volt (bandwidth in MHz).

Option M7. Power meter leveling. Units with this option may be leveled with the "recorder" output of H-P 431B/C series power meters and some other power meters. The plug-in includes a selector for normal or power meter leveling.

Option M9. The RF LEVEL controls of units with this option are calibrated in dBm (0 dBm = 1 mW into 50 Ω).

Option M16. This option substitutes a Type TNC RF OUT connector for the normally-used Type N; this option is not available for 5014, 5015, and 5016 plug-ins.

Option M17. This option adds the circuitry necessary to light an external "unleveled" lamp. Plug-ins to be used in a 50520 system should be ordered with option M17.

Option M22. This option substitutes a 3 mm Type SMA RF OUT connector for the normally-used Type N connector; especially useful above 10 GHz.

Option M24. This option substitutes a precision 7 mm Type APC-7 RF OUT connector for the normally-used Type N connector; especially useful above 10 GHz.

1.4 ACCESSORIES

Storage Cabinet Model 9001. The storage cabinet holds four 5000 series RF plug-ins with their dial scales, and bolts on to the side of a 5000 Sweeper or 5000A Sweep Oscillator to form a unit in 5¼ inches of rack space. The storage cabinet keeps the plug-ins available, and prevents loss of dial scales or damage to plug-ins.

Plug-in Extender Model 9202. This unit fits between the sweep oscillator mainframe (5000, 5000A, 520, or 579/540) and the 5000 series RF plug-in to allow easier access for trouble isolation and repair.

Plug-in Inverter Model 9203. Used in conjunction with the 9202 extender, this unit allows physical inversion of the 5000 series plug-in for easier testing or trouble isolation.

Leveling Cable Model 9105. A 24-inch cable with a male Type BNC connector on one end and a Sealectro connector on the other, this accessory is used with the Kruse external samplers listed in Table 1.1.

Coaxial Adapter Model 9137. This unit is a Type N male to 7 mm precision (APC-7) sexless connector adapter.

1.5 SPECIFICATIONS

The specifications for all standard 5000 series RF plug-ins are listed in Table 1.1; specifications for special plug-ins will be supplied upon request.

Table 1.1 **SPECIFICATION CHART –**

Shown below are Specifications for the most popular RF Plug-Ins. Many o

Plug-In Model Number	Frequency Range		Power Output (Minimum) at Full Output, 50Ω Load		Power Variation vs. Frequency at Full Output, 50Ω Load				
	Rated	Usable	Leveled *mW*	Un-leveled *mW*	Un-leveled *dB*	Leveled, Internal Sampler *dB*	Leveled, Ext., Excl. Sam. Error *dB*	Leveled, External Sampler *dB*	
5005	100 kHz–20 MHz	0.05–20 MHz	20	25	±2	±0.2	±0.05	–	
5006	1–11 MHz	0.8–11.2 MHz	20	25	±2	±0.2	±0.05	±0.2	
5007	10–110 MHz	8–112 MHz	20[2]	30	±2	±0.1[2]	±0.05	±0.2	
5007-1[3]	50–100 MHz	47–103 MHz	20[3]	30	±2	±0.1[3]	±0.05	±0.2	
5008A	50–250 MHz	45–255 MHz	20[2]	30	±2	±0.2[2]	±0.05	±0.2	
5008-4	30–300 MHz	25–305 MHz	20[2]	25	±2	±0.2[2]	±0.05	±0.2	
5008-1	100–500 MHz	90–510 MHz	20[2]	30	±2	±0.2[2]	±0.05	±0.2	
5010	500–1000 MHz	470–1030 MHz	20[1]	30	±2	–	±0.05	±0.2[1]	
5010-M-2	500–1000 MHz	470–1030 MHz	20[2]	25	±2	±0.2[2]	±0.05	±0.2[1]	
5010-3	0.75–1.25 GHz	0.72–1.28 GHz	20[1]	30	±2	–	±0.05	±0.2[1]	
5010-3-M-2	0.75–1.25 GHz	0.72–1.28 GHz	20[2]	25	±2	±0.2[2]	±0.05	±0.2[1]	
5011	1–2 GHz	0.94–2.06 GHz	20[1]	30	±2	–	±0.05	±0.25[1]	
5011-M-2	1–2 GHz	0.94–2.06 GHz	20[2]	25	±2	±0.25[2]	±0.05	±0.25[1]	
5012	1.4–2.4 GHz	1.34–2.46 GHz	20[1]	30	±2	–	±0.05	±0.25[1]	
5012-M-2	1.4–2.4 GHz	1.34–2.46 GHz	20[2]	25	±2	±0.25[2]	±0.05	±0.25[1]	
5013	2–4 GHz	1.9–4.1 GHz	10[1]	13	±2	–	±0.05	±0.3[1]	
5013-M-2	2–4 GHz	1.9–4.1 GHz	10[2]	11	±2	±0.3[2]	±0.05	±0.3[1]	
5014	4–8 GHz	3.9–8.1 GHz	5[1]	6	±5	–	±0.05	±0.4[1]	
5014-10 (dual band)	(1) 3.6–4.2 GHz (2) 5.9–6.5 GHz	(1) 3.55–4.25 GHz (2) 5.85–6.55 GHz	5[1]	6	±2	–	±0.05	±0.2[1,4]	
5014-13	3.6–6.5 GHz	3.55–6.55 GHz	5[1]	6	±2	–	±0.05	±0.2[1,4]	
5015	8–12.4 GHz	7.9–12.5 GHz	5[1]	7	±3	–	±0.05	±0.5	
5015-2	7–11 GHz	6.9–11.1 GHz	3[1]	4	±4	–	±0.05	±0.5	
5016	12.4–18 GHz	12.3–18.1 GHz	3[1]	4	±4	–	±0.05	±1.0[1]	
5016-2	10–15 GHz	9.9–15.1 GHz	2[1]	3	±4	–	±0.05	±1.0[1]	

1 Using Models 1020 to 1036 Directional Samplers.

2 Internal or external leveling.

3 Output 75Ω internally leveled. Flatness 0.01 dB from 55 to 85 MHz, adju Specify Option M-14 for W.E. 509A jack or M-15 for W.E. 567A jack.

Model 5000 Series Oscillator Plug-Ins

ther Units having unique frequency coverage and/or power output are available with full specification upon request.

External Sampler Model	Frequency Accuracy at 25°C, Full Output *MHz*	Spurious Signals, Below Full Output *Harmonic/ Non-Harm. dB*[5]	Residual AM Index at Full Output *dB*	Residual FM Deviation[6] 1 Hz to 30 kHz CW Mode Peak *kHz*	Residual FM Deviation[6] 1 Hz to 30 kHz Sweep Mode Peak *kHz*	Frequency Stability, % of Output Frequency *vs.* Temp. Change *(per °C)*	Frequency Stability, % of Output Frequency *vs* Load VSWR 1:1 to 3:1	Frequency Stability, % of Output Frequency *vs* RF Power Change, Full Range	Frequency Stability, % of Output Frequency *vs.* 10% Line Change	Source VSWR (Max.) at Any Output Level	Vernier Range *MHz*	ΔF Range (Maximum) *MHz*
–	±0.1	20 to .5 MHz 30 to 20 MHz	–46	2	4	±10 kHz	±0.5 kHz	±3 kHz	±1 kHz	–	1	±1
	±0.1	25/60	–46	0.1	0.15	±0.03%	±0.2%	±0.2%	±0.001%	–	0.1	±0.52
1025	±1	30/60	–46	1.5	2	±0.025%	±0.1%	±0.1%	±0.001%	1.5:1	1	±5.2
1025-3	±0.5	40/60	–46	1.5	2	±0.03%	±0.2%	±0.2%	±0.001%	–	1	±2.8
1025	±2	30/60	–46	1.5	2	±0.025%	±0.1%	±0.1%	±0.001%	2:1	1	±10.5
1025	±3	30/60	–46	1.5	2	±0.05%	±0.2%	±0.2%	±0.001%	2:1	10	±14
1025	±4	30/60	–46	1.5	2	±0.03%	±0.2%	±0.2%	±0.001%	2:1	10	±21
1025	±5	20/60	–46	2	4	±0.05%	±1%	±0.2%	±0.001%	2:1	10	±28
1025	±5	20/60	–46	2	4	±0.05%	±1%	±0.2%	±0.001%	2:1	10	±28
025-1	±5	20/60	–46	2	4	±0.05%	±1%	±0.2%	±0.001%	2.5:1	10	±28
025-1	±5	20/60	–46	2	4	±0.05%	±1%	±0.2%	±0.001%	2.5:1	10	±28
1031	±10	20/60	–46	4	8	±0.05%	±1%	±0.25%	±0.001%	2.5:1	10	±56
1031	±10	20/60	–46	4	8	±0.05%	±1%	±0.25%	±0.001%	2.5:1	10	±56
1032	±10	20/60	–46	5	10	±0.05%	±1%	±0.25%	±0.001%	2.5:1	10	±56
1032	±10	20/60	–46	5	10	±0.05%	±1%	±0.25%	±0.001%	2.5:1	10	±56
1033	±20	20/60	–46	10	20	±0.05%	±1%	±0.25%	±0.001%	3:1	100	±110
1033	±20	20/60	–46	10	20	±0.05%	±1%	±0.25%	±0.001%	3:1	100	±110
1034	±40	20/60	–46	30	60	±0.03%	±0.25%	±0.25%	±0.001%	1.5:1	100	±210
044-1[4]	±10	20/60	–46	30	60	±0.02%	±0.1%	±0.1%	±0.001%	1.5:1	10	±35
044-1[4]	±28	20/60	–46	30	60	±0.02%	±0.1%	±0.1%	±0.001%	1.5:1	100	±150
1035	±44	30/60	–46	30	60	±0.03%	±0.2%	±0.2%	±0.001%	1.5:1	100	±230
1035	±40	30/45	–46	30	60	±0.03%	±0.2%	±0.2%	±0.001%	1.5:1	100	±210
1036	±56	30/60	–46	50	100	±0.03%	±0.2%	±0.2%	±0.001%	1.5:1	100	±290
1021	±52	30/45	–46	30	60	±0.03%	±0.2%	±0.2%	±0.001%	2.5:1	100	±260

table.

4 Flatness 0.02 dB over 20 MHz band (0.03 dB over 30 MHz band) using Model 1044-1 Directional Detector and low pass filters, or Model 10001 Levelling Accessories

5 At > 1 MHz from carrier.

6 When used in Model 520, Residual FM is typically 1/2 this value.

SECTION 2

INITIAL INSTRUCTIONS

2.1 UNPACKING AND INSPECTION

The instrument is shipped in a specially constructed container to provide maximum protection to the equipment during transit. Use care when unpacking to prevent damage to the equipment, such as cabinet finish, controls, indicators, connectors, etc.

Removing Contents. To remove the instrument from the shipping container, cut and fold back outer carton top flaps, remove top protective cushion, lift instrument clear from shipping container, open dust protection bag and remove equipment.

Inspection. The instrument was carefully tested and inspected prior to shipment. Inspect the instrument for damage incurred during shipment. If the instrument is damaged in any way, see the warranty and repair notices at the front of this manual.

2.2 PREPARATION FOR USE

Depending upon the type of sweeper with which the 5000 series RF plug-in is to be used, each plug-in is supplied with a clear plastic dial scale, (5000 and 5000A), a metal dial drum (540/579), or a flat metal dial scale (50520). If no preference is stated at the time of ordering, the clear plastic dial scale is shipped.

Installation in 5000 Sweeper or 5000A Sweeper. To install a plug-in in one of these units:

a. Remove the clear plastic dial scale from the bracket on the right side of the plug-in by loosening the two captive knurled knobs.

b. Insert the RF plug-in through the rectangular hole in the sweeper front panel.

c. Lock the plug-in in place by turning the small knob at the top CW.

d. Install the clear plastic dial plate in the large rectangular cutout at the top of the sweeper.

e. Simultaneously tighten both knurled screws by turning CW until they are finger tight. Be sure the dial fits in the panel.

Installation in 50520 Multiband Sweep Systems. Each Model 520 in a 50520 System holds up to four plug-ins:

a. Select the appropriate plug-in compartment in one of the 520's (1 through 4 or 5 through 8).

b. If necessary, remove the blank plug-in panel by turning the locking screw CCW.

c. Insert the RF plug-in into the selected plug-in compartment.

d. Lock the plug-in in place by turning the small knob at the top CW.

e. If necessary, install a new metal dial plate in the 521 Multiband Controller following steps *f* through *i*.

f. Remove the top cover of the 521; it is held in place with two screws.

g. Advance the dial drum assembly until the appropriate blank dial plate (1 through 8) is at the top.

h. Remove the blank dial plate from the dial assembly; it is held in place with four screws.

i. Install the new dial plate with the screws removed in step *h*;

Installation in 540 Multiband Sweeper. A single 5000 series RF plug-in may be installed in a Model 540 sweeper if the 540 has been fitted with a Model 579 adapter:

a. Insert the RF plug-in into the rectangular hole in the center of the 579 adapter.

b. Lock the plug-in in place by turning the small knob at the top CW.

c. If necessary, install a new dial drum in the 540 following steps, *d* through *h*.

d. Remove the top cover of the instrument; it is held in place with two screws.

e. Face the instrument holding the dial scale drum with its gear to the left, and smooth rounded end knob to the right.

f. Push the smooth knob into its mating receptacle near the Plug-in compartment shield. The spring will give way allowing you to lower the left side of the drum.

g. Snap the drum into place and align the locating key with the mating groove in the left side of the drum assembly.

h. Rotate the BAND SELECT knob to assure smooth operation of drum assembly.

2.3 REPACKAGING FOR SHIPMENT

If the instrument is to be packaged for re-shipment, use the original shipping container and packaging. If the original packaging has been discarded or is not in condition for re-use, perform the following packaging procedure:

a. Wrap the instrument in a heavy paper wrapping or plastic protective covering.

b. Place a protective cushion in the bottom of shipping carton and place the instrument on the cushion.

c. Surround the remaining sides and top with additional protective cushions. Place front and rear cushions to provide support of the instrument without resting on the controls or connectors.

SECTION 3

OPERATION

3.1 GENERAL

This section contains abbreviated instructions for the operation of a 5000 series RF Plug-in, but does not contain specific operating information for operation of a plug-in in a particular sweep system. Refer to the sweeper mainframe or sweep system manual for specific operating instructions.

3.2 CONTROLS AND CONNECTORS

The various controls and connectors of a typical 5000 series RF plug-in are shown in Figure 3.1 and described in Table 3.1.

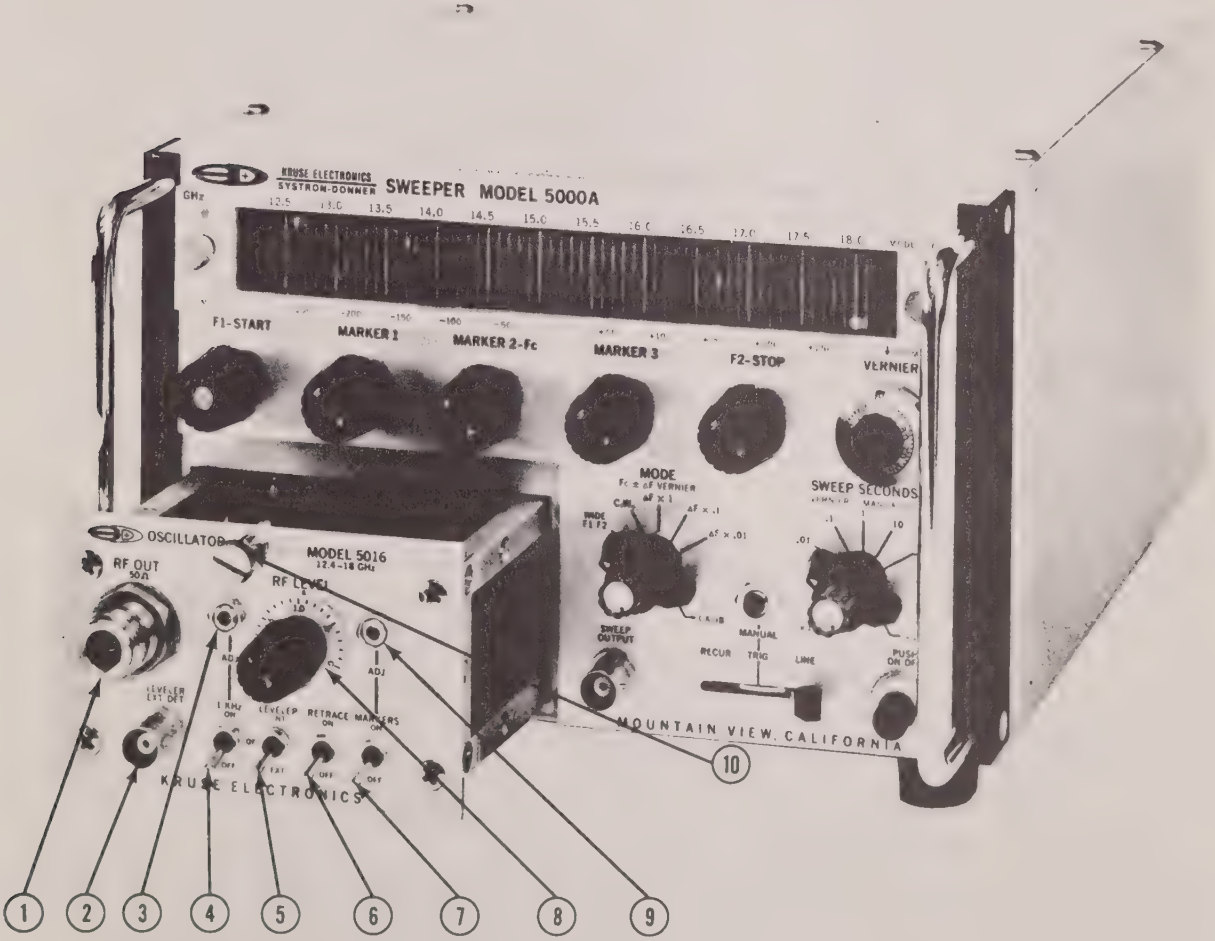


Figure 3.1 5000 Series RF Plug-in Controls and Connectors

Table 3.1 5000 Series RF Plug-in Controls and Connectors

Figure 3.1 Index	*ITEM*	*FUNCTION*
1	RF OUT Connector	Precision Type N connector. RF output point of oscillator. Optional output connectors include TNC, SMA, APC-7, and WE jack. Output impedance is nominally 50 Ω except when ordered with 75 Ω (WE jack).
2	LEVELER EXT DET Connector . . .	BNC connector. Accepts video output of Models 1020 thru 1044 Directional Detectors for precision power leveling at the load. Sensitivity is approximately 10 mV/mW of output power. Input impedance is 5 kΩ, negative polarity.
3	1 KHZ ADJ Control	Screwdriver-adjust potentiometer. Controls the frequency of the internal 1 kHz square wave modulator from ≈ 950 – 1050 Hz.
4	1 KHZ Switch	Toggle switch. When set to ON, AM modulates RF output with 1 KHz squarewave. Rise and fall times < 10 μs at maximum leveled output, on-off ratio > 40 dB (unleveled).
5	LEVELER Switch	
	INT Position	Three position toggle switch: All 5005 through 5008 series plug-ins and 5010 through 5013 series plug-ins with Option M2 include internal power leveling; when the LEVELER switch is set to INT, the RF output is leveled at the RF OUT connector of these plug-ins without the use of an external detector. Plug-ins without internal leveling do not operate properly when the switch is set to INT: there is no control of power level with the RF LEVEL control; the output is either fully on or fully off.
	OFF Position	The RF output is unleveled, but the RF LEVEL control may be used for control. Maximum peak power output is available in this position.
	EXT Position	All plug-ins may be externally leveled using an appropriate leveler (see Table 1.1). In this position, an external negative voltage at the LEVELER EXT DET connector is used to control the RF output over the frequency range of the plug-in.

Figure 3.1

Index	*ITEM*	*FUNCTION*
6	RETRACE Switch	Toggle switch. When set to ON, RF output is left on during the time the sweep circuits are retracing. When the switch is set to OFF, the internal modulator is automatically set to maximum attenuation during retrace.
7	MARKERS Switch	Toggle switch. When set to ON, turns on three RF dip markers as set by 5000 or 5000A Sweep Oscillator mainframe controls. This switch is non-functional when the 5000 RF plug-in is used in a 50520 system or a 540/579 when the 540 does not have the marker option.
8	RF LEVEL Control	Black knob/potentiometer. Controls the RF output amplitude of the plug-in; when the plug-in is internally or externally leveled, the dial graduations read directly in milliwatts (in dBm with Option M9). This control has a range of ≈ 40 dB.
9	MARKERS ADJ Control	Screwdriver-adjust potentiometer. Controls amount of RF signal attenuation at marker points and thus the size of the markers.
10	Locking Screw	Chrome-plated knob. Used to lock 5000 RF plug-in in place in mainframe.

NOTE: This knob must be tightened to ensure low noise and proper seating of the interface connector.

3.3 OPERATING NOTES

Markers. Markers are generated in the 5000 RF plug-in by momentarily reducing the RF output power in response to marker signals from a 5000 Sweeper, 5000A Sweep Oscillator, or a 540/579 (using a 540 with marker option M3). RF dip markers of this type are not generated by a 50520 system or a 540 with marker option M4, which use sweep stop markers.

The size of the markers is controlled by the front-panel MARKER ADJ potentiometer; the minimum size is equivalent to a power reduction of about 0.2 dB. Under certain circumstances, RF dip markers may not be usable: where there is a great deal of attenuation in the system under test, or when the plug-in is generating maximum unleveled power, the markers may not be visible on the detected waveform. In these cases, the other methods of marker generation (video bypass, intensity, sweep stop) described in the sweeper manual should be used.

Retrace. When the front-panel RETRACE switch is set to OFF, the internal modulator of the RF plug-in is automatically driven to maximum attenuation during the time the sweep ramp from

the sweeper is retracing. This eliminates a possibly confusing extra trace from the oscilloscope or display unit screen. However, under certain circumstances the RETRACE switch should be set to ON: where it is desired that the RF output of the plug-in remain on at all times, such as when average power is being measured or when certain chart recorders are being used, and when phase lock systems are in use, the fast-rising pulses at both ends of sweep might cause measurement errors.

Internal Modulator. The internal 1 kHz modulator drives the modulator with a square wave, reducing the RF output of the plug-in on positive 1 kHz peaks. Most VSWR amplifiers and ratiometers will respond to the demodulated 1 kHz signal. If one of these units is being used, the 1 KHZ ADJ control should be tuned for maximum response of the meter in use before measurements are made. Tuning the plug-in modulating frequency to that of the VSWR amplifier will considerably increase the measurement accuracy and signal-to-noise ratio.

Leveling. Leveling is the process which overcomes the natural tendency of RF sources to generate different power levels at different frequencies due to resonances, losses, and other frequency-sensitive factors. The desired end result for the 5000 series RF plug-in is for the power level generated at all frequencies to be identical. For plug-in units operating below about 4 GHz, internal leveling may be used; 100 kHz to 500 MHz plug-ins feature built-in power levelers, and built-in power levelers are optional on 500 MHz to 4 GHz units. When a plug-in is leveled internally, the power level at the RF OUT connector is essentially flat over the specified frequency range.

To be most useful, leveling should be accomplished as closely as possible to the point of measurement; external leveling is most desirable above 500 MHz or so due to the effects of standing waves in the coaxial cables and frequency sensitivities in other coaxial components in a given test setup. When external leveling is used, the power level at the output of the leveler is essentially identical for all output frequencies.

Phase Lock Input. The phase lock input for the 5000 series RF plug-in is physically located on the rear panel of the sweeper mainframe, but electrically connects directly to the oscillator in the plug-in. Generally, the phase lock input is used to directly control the oscillator frequency to maintain a fixed output frequency or to generate FM. In the first case, the output of a discriminator is commonly used; in the second case, the AC-coupled output of a low-frequency oscillator is used. Table 3.2 lists the specifications for the phase lock inputs of some typical plug-ins.

Two Band Operation. Model 5014-10 RF plug-ins are two band (3.6 to 4.2 GHz or 5.9 to 6.5 GHz) units; the band switch is located between items 2 and 4 of Figure 3.1. The dial scale (or 540 dial drum) supplied with the 5014-10 displays both bands.

Table 3.2 Phase Lock Input Specifications

Plug-in Model	*Approximate Impedance (1) (2)*	*Approx. Sensitivity*	*Approx. Response*	*Maximum Deviation*	*Maximum Ratings(3)*
5007	10 kΩ, 200 pF	0.5 to 5 MHz/V	30 kHz	± 50 MHz	40 V/2 mA
5008	100 Ω to 10 M Ω, 200 pF	5 to 15 MHz/V	1 MHz	± 100 MHz	40 V/2 mA
5008-1	100 Ω to 10 M Ω, 200 pF	2 to 40 MHz/V	5 MHz	± 200 MHz	40 V/2 mA
5010	20 Ω to 10 M Ω, 150 pF	1 to 20 MHz/V	15 MHz	± 250 MHz	60V/10 mA
5011	20 Ω to 10 M Ω, 150 pF	2 to 60 MHz/V	15 MHz	± 500 MHz	60V/10 mA
5012	20 Ω to 10 M Ω, 150 pF	5 to 70 MHz/V	15 MHz	± 500 MHz	60V/10 mA
5013	20 Ω to 10 M Ω, 150 pF	5 to 170 MHz/V	30 MHz	± 1000 MHz	60V/10 mA
5013-3	1 K to 10 M Ω, 150 pF	6 to 22 MHz/V	30 MHz	± 250 MHz	60V/10 mA
5014-1	1 K to 10 M Ω, 150 pF	11 to 28 MHz/V	30 MHz	± 250 MHz	60V/10 mA
5014	0.5 Ω, 50 pF	200 kHz/mA	200 kHz	± 200 MHz	1V/1A
5015	0.5 Ω, 50 pF	100 kHz/mA	200 kHz	± 1000MHz	1 V/1A
5016	0.5 Ω, 50 pF	100 kHz/mA	200 kHz	± 100 MHz	1V/1A

(1) Driver source impedance required is less than 50 Ω on all models except 5014, 5015, and 5016.

(2) Series resistance, shunt capacitance.

(3) Maximum voltage/Maximum current.

SECTION 4

MAINTENANCE

4.1 ROUTINE MAINTENANCE

The 5000 series RF plug-ins do not require routine maintenance or calibration; they should of course be kept free of dust and dirt, but no regularly-scheduled maintenance is necessary.

4.2 CORRECTIVE MAINTENANCE

Field repair of 5000 series RF plug-ins is not recommended. The oscillator, heart of the plug-in, is not a field-repairable item. Replacement oscillators can be supplied for replacement in the field, but the following facts should be kept in mind:

- Many oscillators can be repaired at the factory, at far lower cost than that of a new oscillator.
- Even after an oscillator has been replaced, the plug-in unit will still have to be linearized and calibrated by the selection of precision fixed components. This is a job best done at the factory.
- The plug-in unit and oscillators are covered by a one- or two-year warranty; refer to the front of this manual. Attempted repair may void this warranty.

SECTION 5

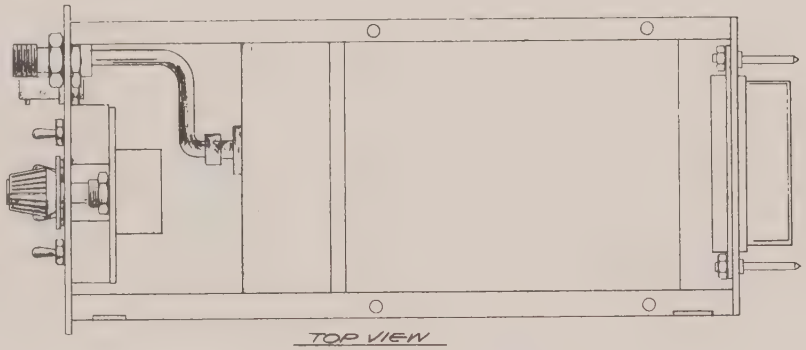
DRAWINGS

This section contains drawings pertaining to the 5000 series RF plug-ins; these drawings are arranged in the following order:

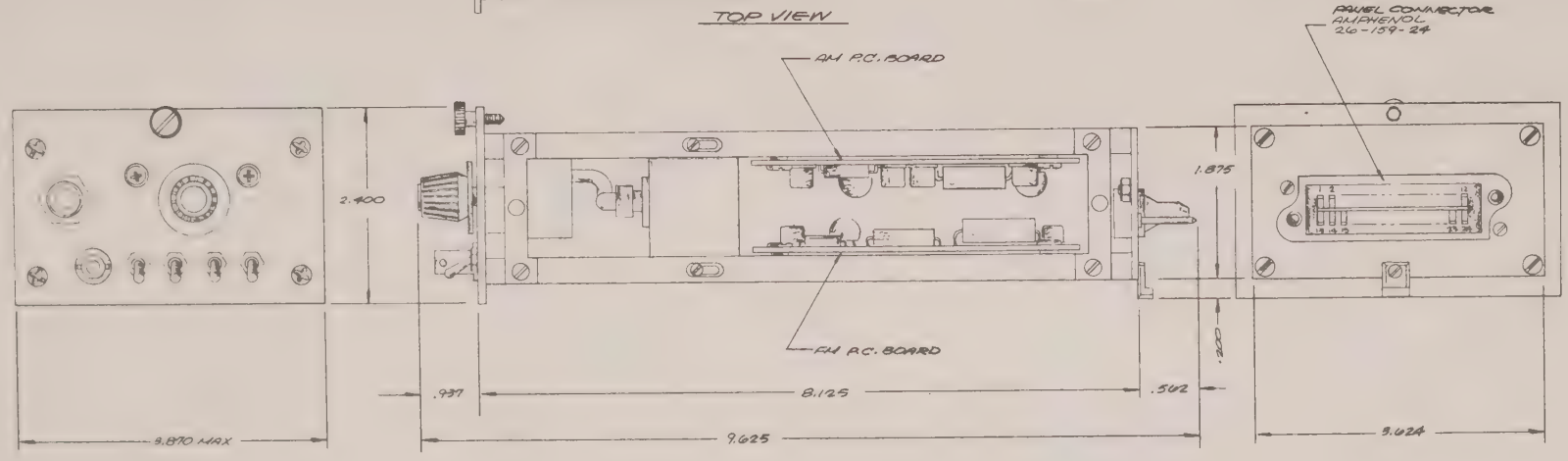
- Outline and Dimensional Drawing (962002)
- Block Diagram, 5000A Sweep Oscillator with 5000 Plug-in (900278)
- Schematic Diagram, 5005 - 5013, 5014-1, 5014-7, 5014-8 (900265)
- Schematic Diagram, 5015-5016 with blue-colored oscillators (900312)
- Schematic Diagram, 5014 with silver-colored oscillators (900387)
- Schematic Diagram, 5014-10 (900412)
- Schematic Diagram, 5015 with red-colored oscillators (900389)
- Schematic Diagram, 5016 with red-colored oscillators (900391)

The serial and model number effectivity of each schematic diagram is listed in the lower-right corner of each drawing. Be sure to match the serial number and model number of your plug-in to the drawing to be sure you are using the proper one.

DATE	SYM	REVISION RECORD	AUTH	DR.	CK.

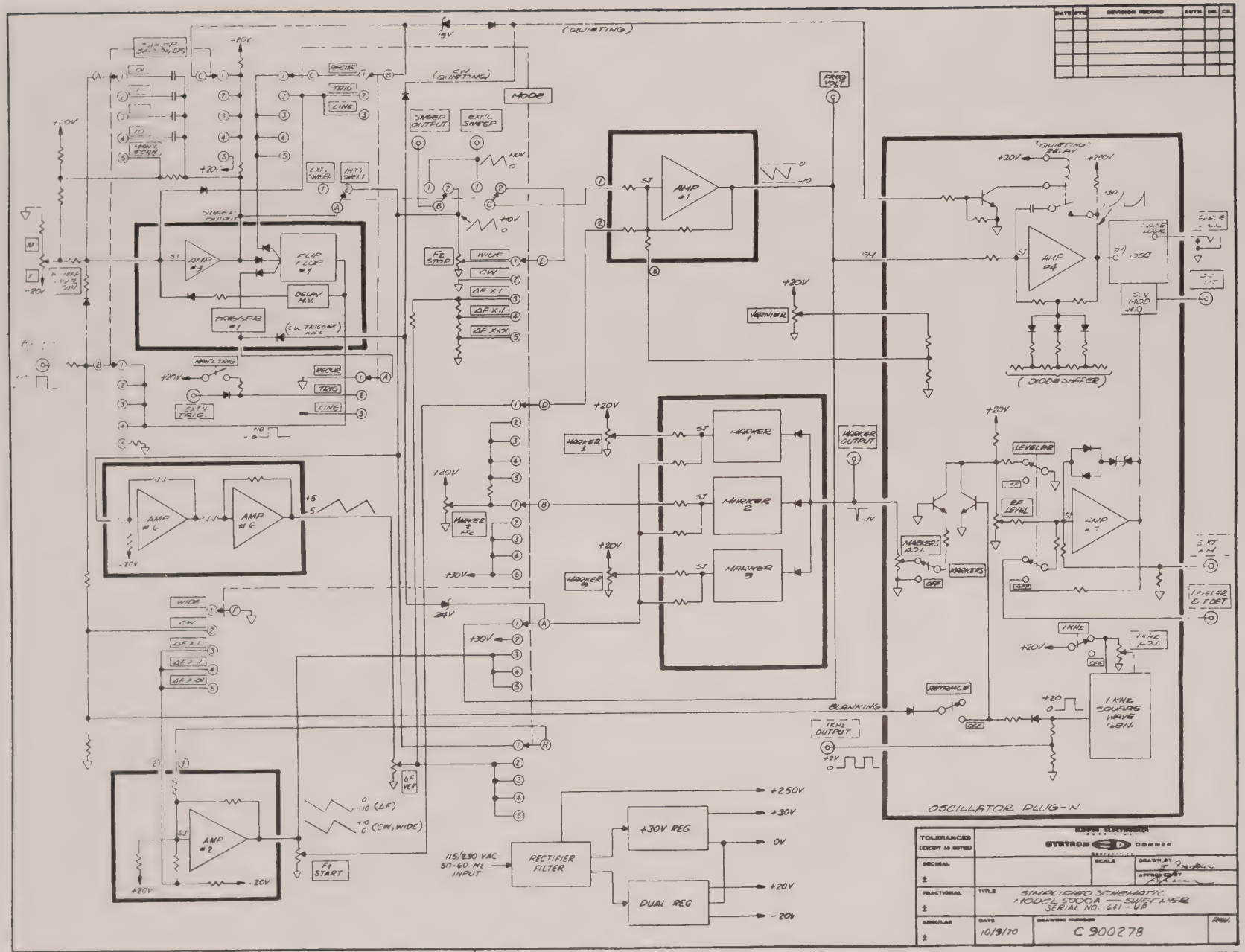


TOP VIEW



TOLERANCES (EXCEPT AS NOTED)	KRUSE MARINE ELECTRONICS MOUNTAIN VIEW, CALIFORNIA		
DECIMAL ±		SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ±	TITLE OUTLINE AND DIMENSIONAL DATA MODEL 5000 PLUG-IN SERIES		
ANGULAR ±	DATE 1-24-67	DRAWING NUMBER B 962002	

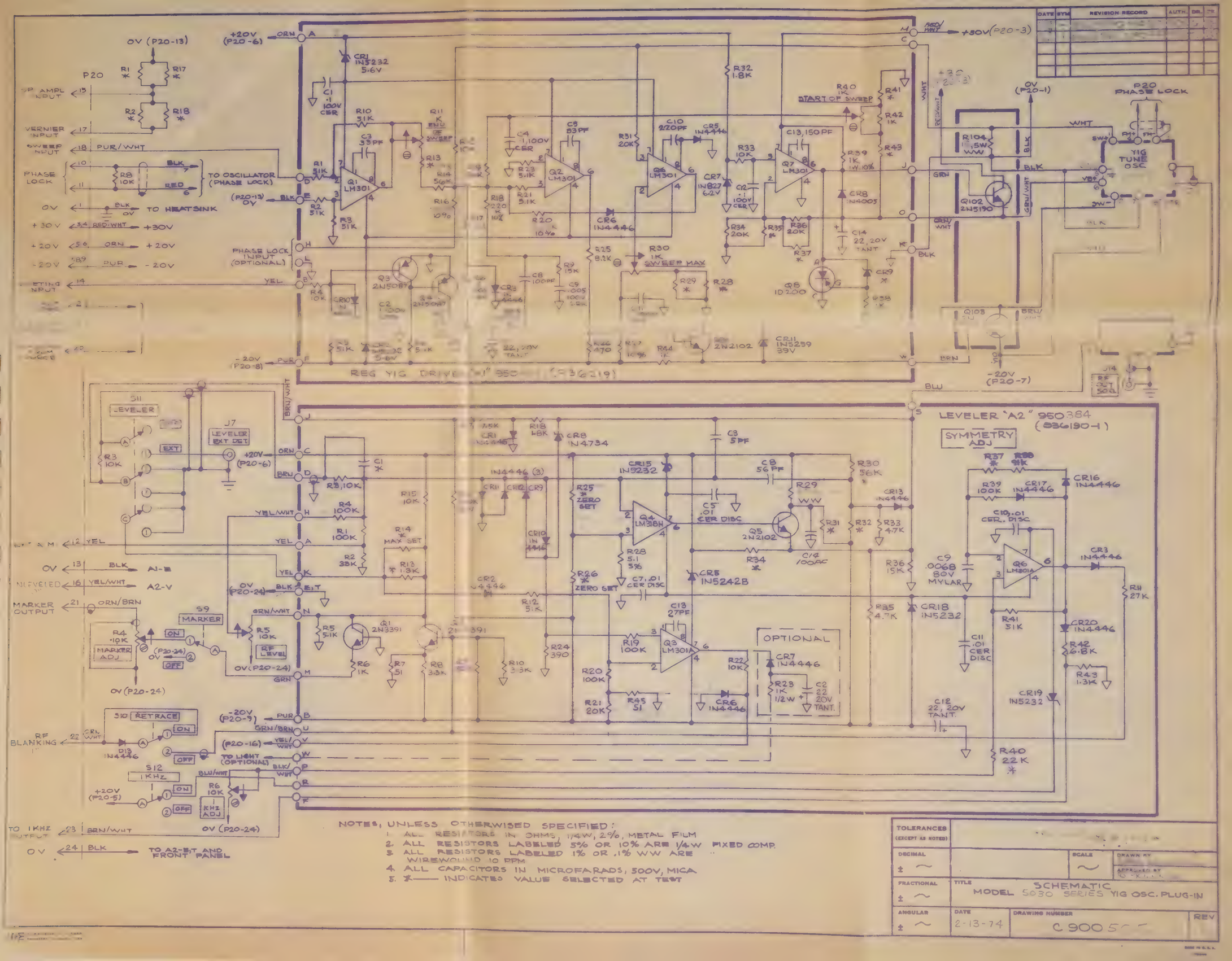
5000A10/70



DATE	BY	REVISION RECORD	AUTH.	DR.	CK.

TOLERANCES (EXCEPT AS NOTED)	SYSTRON DONNER
DECIMAL ±	SCALE — DRAWN BY — APPROVED BY
FRACTIONAL ±	TITLE: SIMPLIFIED SCHEMATIC, MODEL 5000A — SWEEPLINER, SERIAL NO. 661-UP
ANGULAR ±	DATE: 10/9/70 — DRAWING NUMBER: C 900278 — REV.

SIMPLIFIED SCHEMATIC


REG YIG DRIVE "A1" 950
LEVELER "A2" 950384
(836190-1)
SCHEMATIC
MODEL 5030 SERIES YIG OSC. PLUG-IN
C 900 5
2-13-74
NOTES, UNLESS OTHERWISED SPECIFIED:
1. ALL RESISTORS IN OHMS, 1/4W, 2%, METAL FILM
2. ALL RESISTORS LABELED 5% OR 10% ARE 1/4W FIXED COMP.
3. ALL RESISTORS LABELED 1% OR .1% WW ARE WIREWOUND 10 PPM
4. ALL CAPACITORS IN MICROFARADS, 500V, MICA
5. *—— INDICATES VALUE SELECTED AT TEST